Claims 1-12, 14-20, and 22-26 are all the claims pending in the application.

Applicant respectfully submits that entry of the currently amended claims is proper because the currently amended claims will either place the application in condition for allowance or in better form for appeal. Applicant respectfully traverses the rejections based on the following discussion.

I. The Prior Art Rejections

Claims 11-12, 14-16, 19-20, and 22-24 stand rejected under 35 U.S.C. §102(b) as being unpatentable over U.S. Patent No. 6,112,255 to Dunn et al., hereinafter referred to as Dunn. Claims 19-20 and 22-24 stand rejected under 35 U.S.C. §102(b) as being unpatentable over Dunn. Claims 1-7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,557,123 to Wiencko, Jr. et al., hereinafter referred to as Wiencko in view of Dunn. Claim 8 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Wiencko and Dunn, and further in view of U.S. Patent No. 6,021,462 to Minow et al., hereinafter referred to as Minow. Claims 9-10 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Wiencko and Dunn, and further in view of U.S. Patent No. 6,442,711 to Sasamoto et al., hereinafter referred to as Sasamoto. Claims 17-18 and 25-26 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Dunn in view of Sasamoto. Applicants respectfully traverse these rejections based on the following discussion.

A. The 35 U.S.C. 102(b) Rejection Based On Dunn

Applicants respectfully traverse this rejection because Dunn does not teach or suggest controlling the updating of the redundant data according to whether or not the primary disk is predicted to fail, as the claimed invention does. Indeed, the Office Action relies upon a secondary reference (Wiencko) for teachings of predicted disk failure.

More specifically, the claims define that updated data blocks are those data blocks that have experienced a write operation but whose corresponding redundant data block has not experienced the same write operation. The claims somewhat similarly define this using the following language: "said updated data blocks comprising ones of said data blocks that have

received a write operation and a corresponding write operation to a corresponding redundant storage block has not been made." Further, the claims define that only the non-updated redundant storage blocks are updated when the disk is predicted to fail, using language somewhat similar to the following language "if said first disk is predicted to fail in said disk array, only updating said redundant storage blocks corresponding to said updated data blocks."

Support for such claim language is found in the specification. For example, paragraph 0023 explains that the invention provides a system 300 having a directory 325, preferably in the form of a bitmap that tracks the data blocks (strips) 312 comprising the redundant data that has been updated since the redundant data in the data blocks was last refreshed. During normal operation, whenever a block of user data is updated, the data blocks 312 containing the corresponding redundant data, i.e. the redundant data that is affected by the update, is marked in the directory 325. Periodically and/or when the array 305 is relatively idle, the redundant information is updated for any block 312 that has been marked. Then, that block 312 is unmarked. When one or more disks 315 in the array 305 fails or is predicted to fail soon, the system 300 goes through the same process to bring the redundant information stored in data blocks 312 up-to-date. Once all the redundant information in data blocks 312 is updated, the array 305 can tolerate further disk failures without losing data. Moreover, the computer 330 updates only portions of the redundant data that have been altered, which allows the invention to efficiently use its resources.

However, as mentioned above, the Office Action does not rely upon Dunn for teaching such features and such features are not taught in Dunn. Therefore, it is Applicants' position that Dunn does not teach or suggest "maintaining a directory of updated data blocks, said updated data blocks comprising ones of said data blocks that have received a write operation and a corresponding write operation to a corresponding redundant storage block has not been made" and "if said first disk is predicted to fail in said disk array, only updating said redundant storage blocks corresponding to said updated data blocks" as defined by independent claim 1, and similarly defined by independent claims 11 and 19.

Therefore, it is Applicants' position that Dunn does not render obvious independent claims 1, 11, and 19 and that such claims are patentable over Dunn. Further, dependent claims

2-10, 12, 14-18, 20, and 22-26 are similarly patentable, not only because they depend from a patentable independent claim, but also because of the additional features of the invention they define. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw his rejection.

B.   The 35 U.S.C. 102(b) Rejection Based on Wiencko and Dunn

As mentioned above, Dunn does not teach or suggest controlling the updating of the redundant data according to whether or not the primary disk is predicted to fail, as the claimed invention does. Instead, the Office Action relies upon Wiencko for teachings of predicted disk failure.

However, Wiencko merely states that the likelihood of drive failure increases as more drives are added to a disk array system. For example, in column 2, lines 51-61 Wiencko reports that the frequency of single drive failure increases linearly as the number of disks in the system increases. Further, the frequency of two drives failing together is almost the square of the number of disks and the frequency of three drives failing together is almost the cube of the number of disk, and so on and so forth.

While Wiencko states that the likelihood of multiple drive failures in large disk arrays is significant, and that the resultant cost of inaccessibility to mission-critical information can be devastating in terms of lost opportunity, lost productivity and lost customers; Wiencko does not mention anything else about the likelihood of drive failure and clearly does not mention that updating of redundant data should be based upon the likelihood of a disk failure.

Therefore, even if one ordinarily skilled in the art had combined Wiencko and Dunn as is proposed to the Office Action, this proposed combination would not teach or suggest controlling the updating of the redundant data according to whether or not the primary disk is predicted to fail, as the claimed invention does.

Therefore, it is Applicants' position that the proposed combination of Dunn and Wiencko does not teach or suggest "maintaining a directory of updated data blocks, said updated data blocks comprising ones of said data blocks that have received a write operation and a corresponding write operation to a corresponding redundant storage block has not been made" and "if said first disk is predicted to fail in said disk array, only updating said redundant storage

blocks corresponding to said updated data blocks" as defined by independent claim 1, and similarly defined by independent claims 11 and 19.

Therefore, it is Applicants' position that the proposed combination of Dunn and Wiencko does not render obvious independent claims 1, 11, and 19 and that such claims are patentable over the proposed combination of Dunn and Wiencko. Further, dependent claims 2-10, 12, 14-18, 20, and 22-26 are similarly patentable, not only because they depend from a patentable independent claim, but also because of the additional features of the invention they define. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

C.   The 35 U.S.C. 103(a) Rejection Based on Wiencko, Dunn and Minow

As mentioned above, the proposed combination of Dunn and Wiencko does not teach or suggest controlling the updating of the redundant data according to whether or not the primary disk is predicted to fail, as the claimed invention does. In this rejection, the Office Action relies upon Minow for teaching that updating is skipped if the retrievable addresses exceed a fraction of the data stored in the disk array.

However, Minow is not referenced for teaching that updating of redundant data should be based upon the likelihood of a disk failure. Therefore, even if one ordinarily skilled in the art had combined Wiencko, Dunn, and Minow, as is proposed to the Office Action, this proposed combination would not teach or suggest controlling the updating of the redundant data according to whether or not the primary disk is predicted to fail, as the claimed invention does.

Therefore, it is Applicants' position that the proposed combination of Dunn, Wiencko, and Minow does not teach or suggest "maintaining a directory of updated data blocks, said updated data blocks comprising ones of said data blocks that have received a write operation and a corresponding write operation to a corresponding redundant storage block has not been made" and "if said first disk is predicted to fail in said disk array, only updating said redundant storage blocks corresponding to said updated data blocks" as defined by independent claim 1, and similarly defined by independent claims 11 and 19.

Therefore, it is Applicants' position that the proposed combination of Dunn, Wiencko, and Minow does not render obvious independent claims 1, 11, and 19 and that such claims are

patentable over the proposed combination of Dunn, Wiencko, and Minow. Further, dependent claims 2-10, 12, 14-18, 20, and 22-26 are similarly patentable, not only because they depend from a patentable independent claim, but also because of the additional features of the invention they define. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

D.   The 35 U.S.C. 103(a) Rejection Based on Wiencko, Dunn and Sasamoto

As mentioned above, the proposed combination of Dunn and Wiencko does not teach or suggest controlling the updating of the redundant data according to whether or not the primary disk is predicted to fail, as the claimed invention does. In this rejection, the Office Action relies upon Sasamoto for teaching that updating is performed when the load on a disk array is below a threshold value.

However, Sasamoto is not referenced for teaching that updating of redundant data should be based upon the likelihood of a disk failure. Therefore, even if one ordinarily skilled in the art had combined Wiencko, Dunn, and Sasamoto, as is proposed to the Office Action, this proposed combination would not teach or suggest controlling the updating of the redundant data according to whether or not the primary disk is predicted to fail, as the claimed invention does.

Therefore, it is Applicants' position that the proposed combination of Dunn, Wiencko, and Sasamoto does not teach or suggest "maintaining a directory of updated data blocks, said updated data blocks comprising ones of said data blocks that have received a write operation and a corresponding write operation to a corresponding redundant storage block has not been made" and "if said first disk is predicted to fail in said disk array, only updating said redundant storage blocks corresponding to said updated data blocks" as defined by independent claim 1, and similarly defined by independent claims 11 and 19.

Therefore, it is Applicants' position that the proposed combination of Dunn, Wiencko, and Sasamoto does not render obvious independent claims 1, 11, and 19 and that such claims are patentable over the proposed combination of Dunn, Wiencko, and Sasamoto. Further, dependent claims 2-10, 12, 14-18, 20, and 22-26 are similarly patentable, not only because they depend from a patentable independent claim, but also because of the additional features of the invention

they define. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

E. The 35 U.S.C. 103(a) Rejection as Unpatentable over Dunn and Sasamoto

As mentioned above, Dunn does not teach or suggest controlling the updating of the redundant data according to whether or not the primary disk is predicted to fail, as the claimed invention does. Instead, the Office Action relies upon Sasamoto for teachings of predicted disk failure.

However, Sasamoto is not referenced for teaching that updating of redundant data should be based upon the likelihood of a disk failure. Therefore, even if one ordinarily skilled in the art had combined Sasamoto and Dunn as is proposed to the Office Action, this proposed combination would not teach or suggest controlling the updating of the redundant data according to whether or not the primary disk is predicted to fail, as the claimed invention does.

Therefore, it is Applicants' position that the proposed combination of Dunn and Sasamoto does not teach or suggest "maintaining a directory of updated data blocks, said updated data blocks comprising ones of said data blocks that have received a write operation and a corresponding write operation to a corresponding redundant storage block has not been made" and "if said first disk is predicted to fail in said disk array, only updating said redundant storage blocks corresponding to said updated data blocks" as defined by independent claim 1, and similarly defined by independent claims 11 and 19.

Therefore, it is Applicants' position that the proposed combination of Dunn and Sasamoto does not render obvious independent claims 1, 11, and 19 and that such claims are patentable over the proposed combination of Dunn and Sasamoto. Further, dependent claims 2-10, 12, 14-18, 20, and 22-26 are similarly patentable, not only because they depend from a patentable independent claim, but also because of the additional features of the invention they define. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

II.   Formal Matters and Conclusion

In view of the foregoing, Applicants submit that claims 1-12, 14-20, and 22-26, all the claims presently pending in the application, are patentably distinct from the prior art of records and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest time possible.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0441.

Respectfully submitted,

05/19/2008

Dated:_____

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